



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Hiroki MAEDA et al.

Application No.: 10/713,194

Examiner: H. VO

Filed: November 17, 2003

Docket No.: 123848.01

For: INFORMATION RECORDING MEDIUM

BRIEF ON APPEAL

Appeal from Group 1794

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Application No. 10/713,194

**I. REAL PARTY IN INTEREST**

The real party in interest for this appeal and the present application is Dai Nippon Printing Co., Ltd., by way of an Assignment recorded in the U.S. Patent and Trademark Office at Reel 010533, Frame 0659.

**II. RELATED APPEALS AND INTERFERENCES**

There are no prior or pending appeals, interferences or judicial proceedings, known to Appellant, Appellant's representative, or the Assignee, that may be related to, or that will directly affect or be directly affected by or have a bearing upon, the Board's decision in the pending appeal.

**III. STATUS OF CLAIMS**

Claims 13 and 16-22 are on appeal.

Claims 13 and 16-22 are pending.

No claims are allowed, and no claims are objected to only for being dependent from a rejected base claim, but are otherwise allowable.

Claims 13 and 16-23 are rejected.

Claims 1-12 and 14-15 are canceled.

Claim 23 is canceled in an Amendment filed concurrently herewith.

**IV. STATUS OF AMENDMENTS**

A Request for Reconsideration After Final Rejection and a Terminal Disclaimer were filed on May 20, 2008. By an Advisory Action dated July 1, 2008, it was indicated that the Terminal Disclaimer had been entered. Appellants concurrently filed herewith an Amendment After Final Rejection that cancels independent claim 23. Because the Amendment reduces the issues on appeal by canceling rejected independent claim 23, it is expected that the Amendment will be entered.

**V. SUMMARY OF CLAIMED SUBJECT MATTER**

The claimed invention is generally directed to an information recording medium, and more specifically to an information recording medium that utilizes a stable change in specific charge-transport properties of a liquid crystal material. Page 1, lines 4-8. In the claimed invention, the charge-transport properties of the liquid crystal material are stably varied upon phase transfer between a plurality of liquid crystal phases. This allows the invention to provide a novel information recording medium that records information upon the application of thermal energy and reads the recorded information by detecting the value of photoelectric current generated by light applied to an information recorded portion. In addition, the claimed invention can realize multi-valued information recording or analog information recording. Page 1, lines 11-34.

More specifically, the invention of claim 13 is directed to an information recording medium (page 3, lines 11-12; Fig. 1) consisting of a pair of electrodes (page 3, lines 14-15; Fig. 1, items 2a,2b) and a liquid crystal material filled into a gap between said electrodes (page 3, lines 17-18; Fig. 1, item 3). The gap can be, for example, formed by using spacers (Fig. 1, items 4) to separate a pair of substrates (Fig. 1, items 1a,1b). See page 3, lines 11-17. The liquid crystal material of claim 13 comprises a rod-shape liquid crystal compound (page 3, line 35 to page 4, line 7).

Claim 13 further includes several additional limitations to further define the claimed information recording medium. Specifically, claim 13 specifies that the liquid crystal material has a property such that charge-transport properties are varied according to a phase transfer between a plurality of stable liquid crystal phases of the liquid crystal and/or a history of the phase transfer (page 2, lines 4-8; page 3, lines 19-23; page 4, lines 26-37), the phase transfer of the liquid crystal material occurring upon a change in temperature of the liquid crystal material between a crystalline phase at a room temperature to an isotropic phase in a

final state through a smectic phase at an elevated temperature (page 2, lines 9-13; page 4, lines 26-37). The liquid crystal material as claimed comprises a material selected from the group consisting of a phenylbenzothiazole liquid crystal, 4-hexyloxy-4-butanoylbiphenyl, and a phenylnaphthalene liquid crystal wherein the phenylnaphthalene is one selected from the group consisting of 2-(4'-octylphenyl)-6-butyloxynaphthalene, 2-(4'-octylphenyl)-6-nonyloxynaphthalene and a mixture thereof. Page 3, line 35 to page 4, line 19.

Regarding the gap, claim 13 specifies that a thickness of the gap between the electrodes is larger than a domain size of the liquid crystal compound at least in the initial state of the liquid crystal material, and the thickness of the gap between the electrodes being smaller than a domain size of the liquid crystal compound in a cooled state from the isotropic phase in a final state. Page 5, lines 1-13. Finally, claim 13 specifies that the information recording medium is configured so that information can be recorded by application of thermal energy to an area of the medium (page 5, lines 27-32), and recorded information can be read by detecting a value of photoelectric current generated by light applied to the area of the medium at which information was recorded (page 6, lines 9-16).

The invention of independent claim 21 is directed to an information recording medium. Claim 21 includes the same limitations as claim 13, described above, except that claim 21 specifically further specifies that the pair of electrodes is provided on a substrate (page 3, lines 13-15; Fig. 1, items 1a,1b). The remaining limitations in claim 21 are identical to those of claim 13.



**VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

The following ground of rejection is presented for review: claims 13 and 16-22 are rejected under 35 U.S.C. §103(a) as having been obvious over JP 61-280046 in view of EP 763 532 and Kawasumi.

In addition, claim 23 was rejected under 35 U.S.C. §103(a) as having been obvious over Kawasumi (U.S. Patent No. 5,645,758) in view of EP 763 532; as having been obvious over JP 61-280046 in view of Kawasumi; and as having been obvious over JP 09-185043 in view of EP 763 532. However, in view of the cancellation of claim 23 in the Amendment filed herewith, claim 23 is not further addressed herein.

## VII. ARGUMENT

The Examiner rejects pending claims 13 and 16-22 under 35 U.S.C. §103(a) as having been obvious over JP 61-280046 in view of EP 763 532 and Kawasumi. However, the Examiner misconstrues the facts and improperly applies the law relating to obviousness. Proper application of the law to the facts demonstrates that no *prima facie* case of obviousness has been shown, and that the claimed invention would not have been obvious over the applied references. In particular, (1) the combined teachings of JP 61-280046, EP 763 532, and Kawasumi fail to disclose or establish a reason to provide every limitation of the claims; (2) combining the teachings of JP 61-280046, EP 763 532, and Kawasumi is improper; and (3) the Examiner fails to establish a *prima facie* case of obviousness of the claims and has improperly shifted the initial burden of proving non-obviousness to Appellants.

Independent claims 13 and 21 include substantially the same limitations, except that claim 21 further specifies that the pair of electrodes is provided on a substrate. Accordingly, claim 13 is taken as representative of the claimed invention for purposes of this appeal.

### A. Factual Inquiries to Determine Obviousness/Non-Obviousness

Several basic factual inquiries must be made in order to determine obviousness or non-obviousness of claims of a patent application under 35 U.S.C. §103. These factual inquiries are set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966):

Under §103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or non-obviousness of the subject matter is determined. Such secondary considerations are commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances.

The specific factual inquiries set forth in *Graham* have not been considered or properly applied by the Examiner in formulating the rejection of the subject claims. Particularly, the

scope and content of the prior art and the level of ordinary skill in the pertinent art were not properly determined and demonstrated and applied to the claimed invention.

Proper consideration of the factual inquiries demonstrates non-obviousness of the claimed invention.

**B. The Combined Teachings of JP 61-280046, EP 763 532, and Kawasumi Fail to Disclose or Establish a Reason to Provide Every Limitation of Independent Claim 13**

The combined teachings of JP 61-280046, EP 763 532, and Kawasumi fail to disclose or establish any reason to provide an information recording medium having the structure and relationship between an electrode gap size and a liquid crystal compound domain size as claimed. Specifically, the references fail to disclose or establish any reason to provide an information recording medium wherein a thickness of a gap between the electrodes is larger than a domain size of the liquid crystal compound at least in the initial state of the liquid crystal material, but the thickness of the gap between the electrodes being smaller than a domain size of the liquid crystal compound in a cooled state from the isotropic phase in a final state, as claimed.

The Examiner cites JP 61-280046 as disclosing all of the limitations of the claimed invention, except for the instantly claimed thickness of the gap between the electrodes, and the specific liquid crystal as claimed. EP 763 532 is cited as disclosing the specific claimed liquid crystal. The Examiner then argues that Kawasumi discloses the claimed thickness of the gap, and argues that it would have been obvious to combine the references to practice the claimed invention. Applicants disagree.

Kawasumi only discloses a specific liquid crystal composition that comprises a non-polymeric liquid crystal and a second substance dispersed therein. The second substance is a substance having affinity for the liquid crystal and being composed of particles having a particle size and an aspect ratio of a predetermined value or greater. Kawasumi at Abstract.

For example, the second substance can be layered clay minerals, titanium oxide, alumina white (water-insoluble basic aluminum sulfate), calcium carbonate, flaky zinc oxide, flaky aluminum, Berlin blue, hematite oxides, and graphite, as well as the plate-like crystals of various types of ceramics. Also usable are those of organic crystals and organic metal complexes. Col. 20, lines 3-10.

Kawasumi entirely fails to describe or suggest the use of charge-transport properties of the liquid crystal itself as in the claimed invention, where the information recording device is configured so that information can be recorded by application of thermal energy to an area of the device, and recorded information can be read by detecting a value of photoelectric current generated by light applied to the area of the device at which the information was recorded. Kawasumi also fails to teach or suggest the specific claimed structure, namely the specific relationship between the thickness of the gap between the electrodes and the domain size of the liquid crystal compound between two states of an initial state and a cooled state.

The references do not teach or suggest the claim limitation that the thickness of the gap between the electrodes should specifically be smaller than a domain size of the liquid crystal compound in a cooled state from the isotropic phase in a final state, as defined in claim 13. As to this feature, the Examiner merely asserts that "[s]ince the device of JP'064 as modified by Kawasumi and EP '532 comprises the same liquid crystal material and the gap between the electrodes having a thickness within the range as disclosed in the present specification, it is the Examiner's position that the thickness of the gap between the electrodes would be inherently smaller than a domain size of the liquid crystal compound in a cooled state from the isotropic phase in a final state." November 21, 2007, Final Rejection at page 5, first full paragraph. However, this basis for a rejection is clearly improper.

The Examiner nowhere explains *why* one of ordinary skill in the art would not have increased the thickness of the gap between the electrodes in Kawasumi to accommodate the

materials of EP 763 352. Thus, the Examiner fails to address the fact that the gaps in the structures of JP 61-280046 and EP 763 532 are for different liquid crystal materials, while the gap in the structure of Kawasumi is for its particular liquid crystal material.

A simple analogy may help to illustrate this point. Consider the fact that flashlights can be configured to use different size batteries, for example, to provide different brightnesses of light. Here, the Examiner essentially argues that it would have been obvious to use D-size batteries in a flashlight configured for AA-size batteries, but without altering the size of the battery compartment.

Not all display devices are configured to have the claimed relationships between the thickness of the gap and the domain sizes of the liquid crystal compound between the two (initial and cooled) states. The mere provision of a gap between the electrodes with a liquid crystal charge material filled into the gap, does not inherently or obviously provide a device having the recited claim limitations. In fact, the Examiner does not address the fact that the natural inclination would be to increase the gap thickness in order to accommodate the larger size of the liquid crystal material.

While the Examiner attempts to base the rejection on inherency, that basis is improper. The Examiner fails to establish that the combined teachings would "inherently" have the gap size as claimed. In order to establish a *prima facie* case, it is incumbent on the Patent Office to establish this asserted inherency. See *In re King*, 231 USPQ 136 (Fed. Cir. 1986). The Examiner must provide a basis in fact and/or technical reasoning to reasonably support the assertions that the allegedly inherent characteristic of the information recording medium *necessarily flows* from the teachings of the cited reference. See *Ex parte Levy*, 17 USPQ2d 1461, 1464 (PTO Bd. Appl. & Int. 1990).

Absent some additional teaching that establishes that the information recording medium would necessarily achieve this feature of the gap size of claim 13, the Examiner fails

to establish the asserted inherent characteristics. Moreover, any such additional teaching relied upon for the purpose of establishing inherency of operation of the information recording medium, "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." See *Continental Can Co. v. Monsanto Co.*, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991). No such additional teaching is presented in the Office Action.

Because the references fail to disclose or suggest at least this limitation of claim 13, the references would not have rendered obvious the claimed invention. The rejection is improper for at least this reason, and thus must be reversed.

Reconsideration and reversal of the rejection are respectfully requested.

**C.     Combining the Teachings of JP 61-280046,  
          EP 763 532, and Kawasumi is Improper**

The applied combination of references is improper because no reason or rationale exists for one of ordinary skill in the art to have combined the teachings of JP 61-280046, EP 763 532, and Kawasumi.

In particular, while JP 61-280046 is cited as allegedly disclosing the claimed invention except for the gap and liquid crystal limitations, JP 61-280046 in fact is directed to an optical recording medium that is different in operation and use from the device of the claimed invention. JP 61-280046 is specifically directed to particular liquid crystal compositions that mainly utilize electro-optical properties. However, the claimed device does not utilize such electro-optical properties. Instead, the claimed invention utilizes charge-transport properties of the liquid crystal itself, where the information recording device is configured so that information can be recorded by application of thermal energy to an area of the device, and recorded information can be read by detecting a value of photoelectric current generated by light applied to the area of the device at which the information was recorded.

Nowhere do any of the references teach or suggest that the materials of EP 763 532 and/or Kawasumi could or should be substituted for the materials of JP 61-280046. Nor do any of the cited references teach or suggest that the resultant optical recording medium would still work, and/or could or should be modified to operate by the different principle as claimed. The Examiner fails to provide any reason or rationale to substantiate the combination of the cited references in a manner that would provide a working product.

Accordingly, because it is improper to combine the teachings of JP 61-280046, EP 763 532, and Kawasumi in the first place, for at least this additional reason, the applied references would not have rendered obvious independent claim 13. The rejection is improper for at least this additional reason, and thus must be reversed.

**D.     The Examiner Fails to Establish a *Prima Facie* Case of Obviousness of the Claims**

The Examiner fails to establish *prima facie* obviousness of independent claim 13 and the remaining claims on appeal. Instead of the references or the art in general providing the reason for combining the references, the Examiner relies entirely on hindsight. The Examiner thus improperly shifts the burden to the Applicants to demonstrate the non-obviousness of the claimed invention.

The only stated reason asserted by the Examiner for maintaining a smaller thickness of the gap if the liquid material of EP 763 532 were used, is because it is within the range "disclosed in the present specification" - a reason that is clearly based only on improper hindsight and reconstruction of the claimed invention based on Applicants' own teachings. As described above, this feature is not taught or suggested by the cited references, and none of the references provides any reason or rationale as to why one of ordinary skill in the art would have used a gap size meeting the limitations as presently claimed for the different materials of JP 61-280046 and EP 763 532.

It has clearly been held that the reason, suggestion or motivation for combining the references "can not come from the applicant's invention itself." *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). That is, the reason for combining the references can not be a product of hindsight reconstruction of the claimed invention based on applicant's own disclosure. Such a hindsight reconstruction has clearly been made in the present Office Action. The Office Action asserts that the claimed invention would have been obvious based on a hindsight selection of the claimed limitations, as evidenced at least by the differences in information recording utilized by the medium of JP 61-280046 as compared to the claimed information recording medium. Such a combination is improper because the references, viewed by themselves and not in retrospect, must suggest the combination asserted by the Office Action. *In re Shaffer*, 229 F.2d 476, 108 USPQ 326 (C.C.P.A. 1956); *In re Stoll*, 523 F.2d 1392, 187 USPQ 481 (C.C.P.A. 1975). Here the references do not provide any reason or rationale for combining the divergent teachings. The only reason for combining the cited references in the manner asserted in the Office Action derives from the disclosure of the present application, which is clearly improper.

**E. Conclusion**

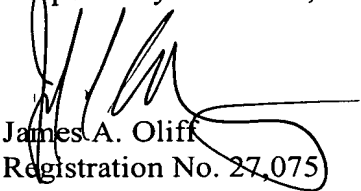
For all the reasons set forth above, it would not have been obvious for one of ordinary skill in the art to have combined the teachings of JP 61-280046, EP 763 532, and Kawasumi to have arrived at the composition of independent claim 13, and the remaining claims on appeal.



**VIII. CONCLUSION**

For all of the reasons discussed above, it is respectfully submitted that the rejection is in error and that claims 13 and 16-22 are in condition for allowance. For all of the above reasons, Appellants respectfully request this Honorable Board to reverse the rejections of claims 13 and 16-22.

Respectfully submitted,



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**APPENDIX A - CLAIMS APPENDIX**

**CLAIMS INVOLVED IN THE APPEAL:**

13. An information recording medium consisting of:
- a pair of electrodes; and
  - a liquid crystal material filled into a gap between said electrodes, the liquid crystal material comprising a rod-shape liquid crystal compound;
- wherein
- the liquid crystal material has a property such that charge-transport properties are varied according to a phase transfer between a plurality of stable liquid crystal phases of the liquid crystal and/or a history of the phase transfer, the phase transfer of the liquid crystal material occurring upon a change in temperature of the liquid crystal material between a crystalline phase at a room temperature to an isotropic phase in a final state through a smectic phase at an elevated temperature;
  - the liquid crystal material comprises a material selected from the group consisting of a phenylbenzothiazole liquid crystal, 4-hexyloxy-4-butanoylbiphenyl, and a phenylnaphthalene liquid crystal wherein the phenylnaphthalene is one selected from the group consisting of 2-(4'-octylphenyl)-6-butyloxynaphthalene, 2-(4'-octylphenyl)-6-nonyloxynaphthalene and a mixture thereof;
  - a thickness of the gap between the electrodes is larger than a domain size of the liquid crystal compound at least in the initial state of the liquid crystal material, and the thickness of the gap between the electrodes being smaller than a domain size of the liquid crystal compound in a cooled state from the isotropic phase in a final state; and
  - the information recording medium is configured so that information can be recorded by application of thermal energy to an area of the medium, and recorded information

can be read by detecting a value of photoelectric current generated by light applied to the area of the medium at which information was recorded.

16. The information recording medium according to claim 13, wherein at least one of the pair of electrodes is transparent to light.

17. The information recording medium according to claim 13, wherein a thermal head or a laser beam is used as means for applying thermal energy for information recording.

18. The information recording medium according to claim 13, wherein the phenylbenzothiazole liquid crystal material is 2-(4'-heptyloxyphenyl)-6-dodecylthiobenzothiazole.

19. The information recording medium according to claim 13, wherein the liquid crystal material comprises a liquid crystalline charge-transport material,

a background for information recording is in a state that the charge-transport properties are inhibited attributable to polycrystalline structural defects in the initial state of the liquid crystal charge-transport material, and

information recording is carried out by phase transfer caused in the background upon the application of thermal energy.

20. The information recording medium according to claim 13, wherein two or more charge-transport properties can be developed in a specific liquid crystal phase according to the level of the thermal energy applied.

21. An information recording medium consisting of:  
a pair of electrodes, wherein the pair of electrodes is provided on a substrate;  
and

a liquid crystal material filled into a gap between said electrodes, the liquid crystal material comprising a rod-shape liquid crystal compound;

wherein

the liquid crystal material has a property such that charge-transport properties are varied according to a phase transfer between a plurality of stable liquid crystal phases of the liquid crystal and/or a history of the phase transfer, the phase transfer of the liquid crystal material occurring upon a change in temperature of the liquid crystal material between a crystalline phase at a room temperature to an isotropic phase in a final state through a smectic phase at an elevated temperature;

the liquid crystal material comprises a material selected from the group consisting of a phenylbenzothiazole liquid crystal, 4-hexyloxy-4-butanoylbiphenyl, and a phenylnaphthalene liquid crystal wherein the phenylnaphthalene is one selected from the group consisting of 2-(4'-octylphenyl)-6-butyloxynaphthalene, 2-(4'-octylphenyl)-6-nonyloxynaphthalene and a mixture thereof;

a thickness of the gap between the electrodes is larger than a domain size of the liquid crystal compound at least in the initial state of the liquid crystal material, and the thickness of the gap between the electrodes being smaller than a domain size of the liquid crystal compound in a cooled state from the isotropic phase in a final state; and

the information recording medium is configured so that information can be recorded by application of thermal energy to an area of the medium, and recorded information can be read by detecting a value of photoelectric current generated by light applied to the area of the medium at which information was recorded.

22. The information recording medium according to claim 13, wherein the thickness between the pair of electrodes satisfies both requirements represented by inequalities (A) and (B):

(A) (Permeation depth at excitation light wavelength of liquid crystal material)  
 $<$  (Thickness between pair of electrodes)

(B) (Thickness between pair of electrodes) < (Thickness which can exhibit field strength such as to enable reading of photoelectric current).

**APPENDIX B - EVIDENCE APPENDIX**

NONE

**APPENDIX C - RELATED PROCEEDINGS APPENDIX**

Copies of relevant decisions in the following related proceedings are attached:

NONE